MACON COUNTY SOILS

A Revision of Soil Report 45

By H. L. WASCHER and R. T. ODELL

UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION

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A Revised Report

By H. L. Wascher and R. T. Odell[1]

THE ORIGINAL SOIL REPORT for Macon county, published in 1929, is no longer available, but there is still a supply of the soil maps which accompanied that report. Since these maps have very definite value, this new report has been prepared to accompany them and give up-to-date information that will add to their usefulness.

Many changes have taken place in the mapping and naming of soil types since 1929. Most of the types shown on the early maps have been subdivided into two or more types. Even where there has been no subdivision, the names have been changed — soil types are now designated by place names rather than by the former descriptive names. More thorough descriptions have been prepared and much new information on soil fertility and crop productivity is now available.

HOW TO USE THIS REPORT WITH THE MAPS

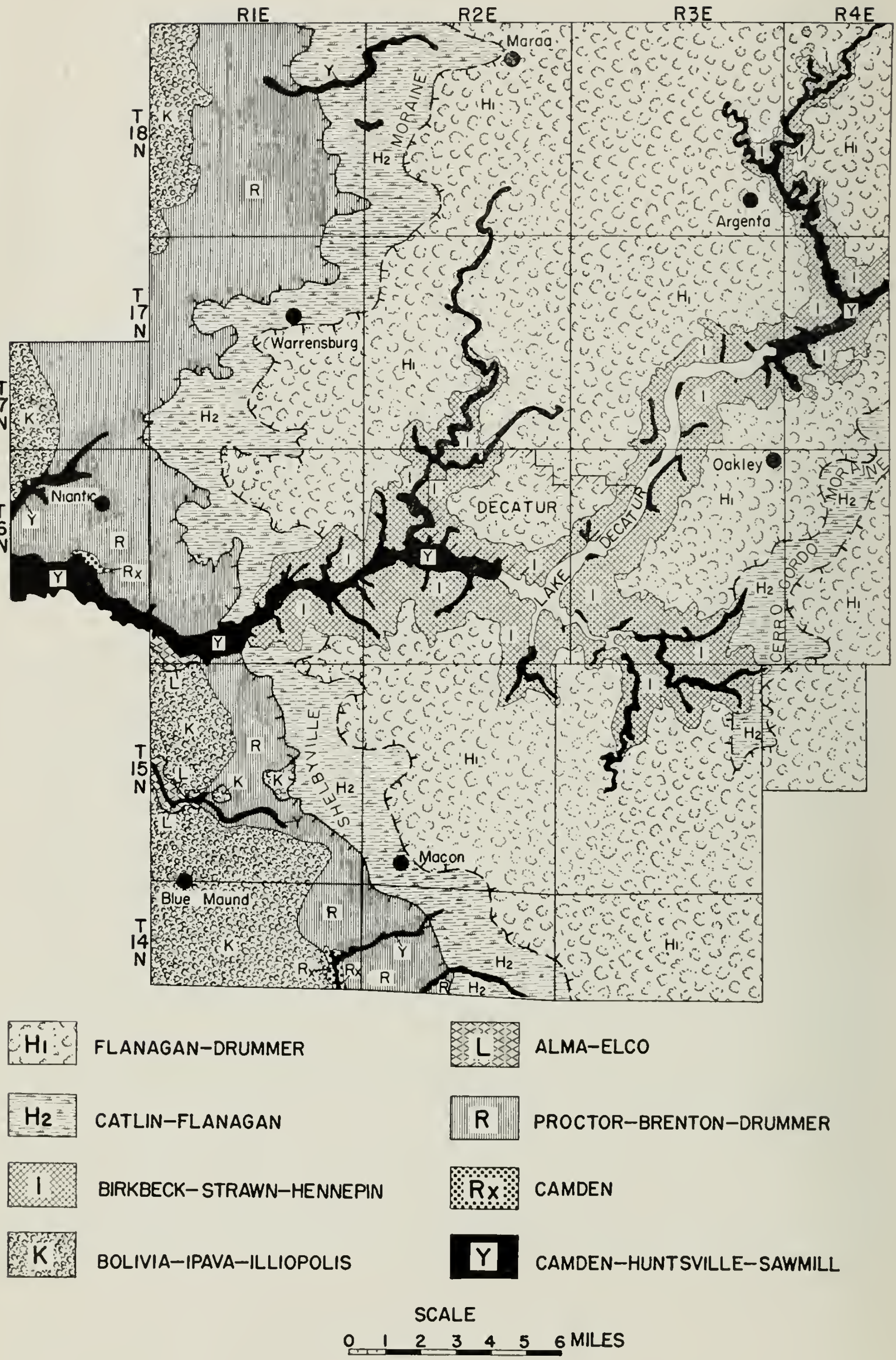
First, locate your farm on the soil map and notice the old names for the soil types that occur on your farm. Then, turn to the descriptions of the soil types given on pages 13 to 29. Here the *old* soil type names are given as the major headings, and underneath them are listed the names now applied to the various subdivisions. Where merely a change in name is involved both the old name and the corresponding new name are given.

By comparing the descriptions with the soils on your farm, you should be able to recognize the finer divisions into which many of the old types are now classified. This will be easier if you observe the slope of the land, since slope was one of the bases for defining the new types.

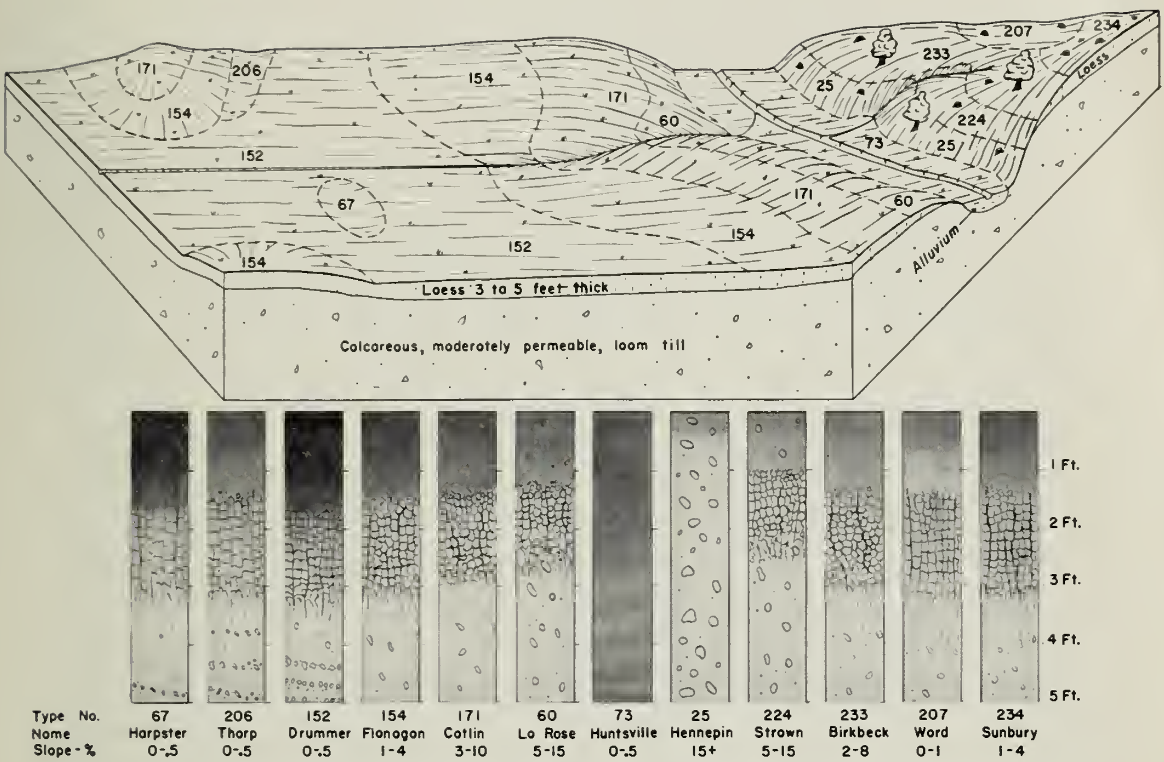
As a further aid in identifying soil types, the county has been mapped according to its main soil association areas (Fig. 1). Included in each soil type description is the area (or areas) in which that particular type is found. Other aids are a three-dimensional sketch of a section of Flanagan-Drummer and Birkbeck-Strawn-Hennepin landscape (Fig. 2) and a key of the soil types known to occur in Macon county (Table 5).

After you have identified the soils on your farm, you can find out from the following section what yields can be expected from them. The general management practices necessary to obtain good yields and at the same time save the soil are discussed on pages 4 to 12; while on pages 12 and 13 are some suggestions for working out a detailed plan for your farm.

[1] H. L. Wascher, Assistant Professor of Soil Physics; and R. T. Odell, Professor of Soil Physics.



Soil association areas of Macon county. Comparison of this map with the old soil map will help you to identify the soils on your farm. (Fig. 1)



EFFECT OF TOPOGRAPHY AND NATIVE VEGETATION ON SOIL

(Landscape predominantly Flanagan-Drummer and Birkbeck-Strawn-Hennepin)

The upper part of the above diagram shows how six prairie soils (left), one bottomland soil (No. 73), four forest soils, and one prairie-forest transition soil (right) are located with reference to topography, or lay of the land. Tufts of grass indicate areas originally covered by native grasses and other prairie plants. Trees and tree stumps indicate forest soil areas, while stumps and grass tufts together, at the extreme right, indicate the prairie-forest transition area. The bottomland may have been covered with either grasses or trees or both.

The general nature of the different layers making up the profile of each soil type is shown by the panels in the bottom part of the diagram. These soils differ in the amount of organic matter they contain, as shown by the shadings of the surface and lower horizons — the darker the shading the higher the content of organic matter. They also differ in the amount of clay in the subsoil — the more distinct and more blocky structural aggregates generally being associated with greater amounts of clay. These differences trace back to topography and depth to the watertable and to the kind of vegetation native to the area. The material forming Huntsville, a bottomland soil, has not been in place long enough to develop a profile — its color and texture are about the same as when it was laid down.

Most Macon county soils were formed from 3 to 5 or 6 feet of loess, as indicated by the general absence of stones or pebbles in the upper layers. However, on the steeper slopes, all or nearly all of the loess may be eroded away, exposing the underlying till. This has occurred in Types 25, 60, and 224. (Fig. 2)

WHAT YIELDS CAN BE EXPECTED IN MACON COUNTY?

In Illinois high crop yields year after year are the result of good soil and good management. Low yields may be caused by a poor soil, by trying to grow crops that are not adapted to the soil, or by faulty management.

Results of Moderately Good Management

Table 1 shows what yields can reasonably be expected from Macon county soils, as an average, over a period of years under moderately good soil management. If you find that your average yields for five years or longer are much below those shown in Table 1 for your soil types, it will pay you to examine your management practices to see where changes should be made. A minimum of at least five years is necessary for a valid comparison because of the wide seasonal variations that occur in rainfall, temperature, wind, and insect and disease injury.

Higher Yields Are Possible

While crop yields below those shown in Table 1 usually indicate faulty management, higher yields are quite possible with superior management practices. In fact, on most Macon county soils, the crop yields shown in Table 1 can be increased by about one-third (*see* Table 4, page 14).

To get maximum yields, liberal applications of nitrogen, phosphorus, and potassium fertilizers are necessary unless the soil already has enough of these nutrients. Soluble phosphates drilled with wheat and other small grains will increase yields in many seasons. Applying mixed fertilizer for corn at planting time and side-dressing with nitrogen during the growing season is often profitable, especially on second-year corn or in other situations where the nitrogen-supplying power of the soil is low. Most minor elements have not yet been found deficient, but applications of boron have increased alfalfa yields in a few cases.

Other practices necessary for superior management include large and regular additions of readily decomposable organic matter, adequate erosion-control practices, use of proper crop varieties and planting rates, control measures for insects, diseases, and weeds, and good tillage practices.

WHAT ARE THE REQUIREMENTS OF GOOD SOIL MANAGEMENT?

Basically, the requirements for good soil management are similar throughout Macon county. In addition, specific management practices are often necessary on each soil type for highest practicable yields. The following discussion points out the requirements common to all good soil-management programs. Special requirements for each type are included under the discussion of that type.

Good Drainage Is Necessary

No poorly drained soil can be consistently productive. While natural drainage is adequate on some soils in Macon county, others should be tiled, and on still others surface ditches must be used. To plan an effective drainage system, therefore, it is necessary to recognize the differences in soils.

Most soil areas where all slopes are less than about 2 percent need artificial drainage. The main dark-colored soils found in such areas (indicated by *new* type numbers) are 43, 65, 67, 73, 74, 107, 149, 152, 154, and 246. All of these types usually tile-drain well if good outlets are provided. A few dark-colored soils, however, do not tile-drain well. Principal among these is Peotone silty clay loam (330), which occupies most of the depressions with no surface outlet. This

Table 1. — AVERAGE YIELDS OF CROPS

To Be Expected on Macon County Soils Over a Period of Years Under a Moderately High Level of Management

Yield figures in **bold face** are based on long-time records kept by farmers in cooperation with the Department of Agricultural Economics; the others are estimated yields. The average crop yields given are for adequately drained areas where erosion is not serious. All actual yields used as a basis for this table were obtained *without the use of mixed fertilizers, commercial nitrogen, or potassium.* Additions of these materials where needed would of course increase crop yields above those given in this table.

Type No.	Soil type name	Corn	Oats	Wheat	Soybeans
		bu.	*bu.*	*bu.*	*bu.*
8	Hickory loam	N[a]	N	N	N
25	Hennepin loam	N	N	N	N
43	Ipava silt loam	**68**	**50**	**26**	**28**
45	Denny silt loam	47(D)	34(D)	18(D)	20(D)
60	LaRose silt loam	N	41(E)	21(E)	N
65	Illiopolis silty clay loam	**66**	**48**	**25**	**28**
67	Harpster silty clay loam	65(D)	44(D)	21(D)	25(D)
73	Huntsville loam	65(D)	48(D)	25(D)	28(D)
74	Radford silt loam	60(D)	40(D)	23(D)	25(D)
87	Sumner sandy loam	**45**	**35**	**18**	**16**
88	Hagener loamy sand	43(E)	33	18	17(E)
103	Houghton muck	60(D)	N	N	20(D)
107	Sawmill silty clay loam	65(D)	44(D)	24(D)	27(D)
118	Alma silt loam	45(E)	36(E)	21(E)	19(E)
119	Elco silt loam	N	35(E)	20(E)	N
134	Camden silt loam	49	37	21	20
136	Brooklyn silt loam	43(D)	28(D)	17(D)	19(D)
148	Proctor silt loam	**64**	**48**	**24**	**25**
149	Brenton silt loam	**71**	**53**	**26**	**27**
150	Onarga sandy loam	47	36	21	20
152	Drummer silty clay loam	**70**	**49**	**25**	**28**
154	Flanagan silt loam	**71**	**53**	**26**	**27**
171	Catlin silt loam	**64**(E)	**46**	**24**	**24**(E)
185	Roby sandy loam	37(E)	28	17	15(E)
186	Kincaid fine sandy loam	N	25(E)	15(E)	N
206	Thorp silt loam	**56**	**41**	22	24
207	Ward silt loam	50(D)	35(D)	20(D)	21(D)
224	Strawn silt loam	N	36(E)	20(E)	N
233	Birkbeck silt loam	58(E)	41(E)	23(E)	23(E)
234	Sunbury silt loam	63	44	24	25
246	Bolivia silt loam	**64**	**49**	**25**	**26**
247	Tovey silt loam	**60**(E)	**46**(E)	**23**(E)	**24**(E)
259	Assumption silt loam	49(E)	37(E)	21(E)	N
330	Peotone silty clay loam	60(D)	N	N	20(D)

[a] LETTERS HAVE THE FOLLOWING MEANINGS: D = Yields for bottomland soils and depressional spots are based on the assumption that there is no loss from flooding. E = Crop not adapted unless erosion-control measures are used. For sandy soils, such as Hagener, Roby, and Kincaid, wind erosion is the problem. N = Crop not adapted.

soil underdrains so slowly and receives so much runoff that tile are mostly ineffective and drainage should depend primarily on surface ditches.

Similarly, nearly level areas of moderately dark- to light-colored soils usually have such slow underdrainage that tiling doesn't pay. It is often more profitable to remove excess water from these areas by surface ditches or furrows. Where tile are already installed, catch basins or other surface inlets into the tiling system can be used. The most common soil types in these areas are numbers 45, 136, 206, and 207.

Test Soils for Acidity, Phosphorus, and Potassium

The removal of crops from the land year after year and the dissolving-and-leaching action of rain finally cause soils in a humid climate to become acid and deficient in available phosphorus and potassium. Such soils cannot produce satisfactory yields.

To find out where limestone and fertilizer are needed on your farm and how much of each should be applied, have your soil tested and then study the results in connection with the soil map. It often happens that some parts of a field are acid and low in phosphorus or potassium (or both), while other parts of the same field do not need any limestone or fertilizer at all.

Apply Needed Limestone and Fertilizer

Soil acidity is easily corrected by applying ground limestone. Potash fertilizers should be applied to soils deficient in available potassium, and phosphate fertilizers to those low in phosphorus.

Very often rock phosphate and superphosphate may be used interchangeably or in conjunction with each other to maintain or increase the supply of available phosphorus in soils. Under some conditions, however, one form of phosphate is superior to the other. For example, soluble phosphates should be used instead of rock phosphate on calcareous (limey) soils. If one form of phosphate gives definitely better results than the other on a particular soil type, the fact is mentioned in the discussion of that type.

Organic Matter and Nitrogen Require Special Attention

Adequate supplies of nitrogen and decaying organic matter in the soil are necessary for vigorous crop growth and maximum productivity. Unlike phosphorus and potash, nitrogen is not one of the soil minerals. It must be added to the soil, and the best way to add it is in the form of organic matter, especially leguminous plant residues. Readily decomposable organic matter also helps to keep the soil in good physical condition.

Commercial fertilizers containing nitrogen can be used at a profit during periods of high grain prices, as many farmers have found from their own experience. Also, the use of adequate nitrogen fertilizer, together with the proper management of crop residues, will increase the quality and quantity of the organic matter added to the soil. Nitrogen fertilizer should be used only as a supplement to organic matter, not as a substitute.

Select a Good Rotation

A good rotation should not only provide a satisfactory income, but also conserve the soil and maintain it in a good physical condition.

Most soils, under continued cultivation, tend to develop a compacted surface and a "plow-sole," or compacted layer, just below plow depth. Often the presence of these compacted layers is not suspected until they become so bad that they seriously interfere with underdrainage and root penetration. Standover grasses and deep-rooting legumes in the rotation help to keep such conditions from getting started, or to break up compacted layers that have already developed.

Grasses are excellent for maintaining desirable surface structure. Their dense fibrous root systems help to bind the soil particles together in granules, thus increasing the power of the soil to absorb water and providing better protection against erosion. Deep-rooting legumes, such as sweet clover and alfalfa, will help to develop and maintain a good physical condition in the deeper portions of many soils, thus lessening the danger of plow-soles.

Not only is it important to adopt a good rotation — it is just as important to manage the rotation properly. Crop residues, as well as part of the top growth of the legumes, should be returned to the soil.

Some suggested rotations. The following four-field cropping system not only provides for deep-rooting legumes and legume-grass mixtures, but also has other advantages for corn belt farms.

	Field 1	**Field 2**	**Field 3**	**Field 4**
1955	Corn	Soybeans	Wheat (sweet clover)	Alfalfa-brome
1956	Soybeans	Wheat	Corn	Alfalfa-brome
1957	Wheat (sweet clover)	Alfalfa-brome	Soybeans	Corn
1958	Corn	Alfalfa-brome	Wheat	Soybeans
1959	Soybeans	Corn	Alfalfa-brome	Wheat (sweet clover)
1960	Wheat	Soybeans	Alfalfa-brome	Corn
1961	Alfalfa-brome	Wheat (sweet clover)	Corn	Soybeans
1962	Alfalfa-brome	Corn	Soybeans	Wheat

The above system is essentially a four-year rotation — three years are devoted to cash and feed grains and one year to a grass and deep-rooting perennial legume. A special advantage in this system is that alfalfa stays down two years; thus a farmer gets crops two years with one seeding. This system also provides a green-manure catch crop, sweet clover, to be plowed down for corn. When fall plowing is practiced, however, it may not be advisable to use sweet clover because this crop is hard to kill with fall plowing.

In this system soil-improving-and-conserving legumes are on one-fourth of the land one year and half the land the next year, or on an average of more than one-third (37½ percent) of the land yearly. The legumes come at times in the rotation when the nitrogen supply in the soil is lowest. The corn crops follow deep-rooting legumes and thus benefit from the nitrogen they supply.

A four-field cropping system of this kind can be fitted into various situations without sacrificing its main features. It can be adjusted to differences in soil productivity or the tendency of a soil to erode, to different types of farming, to the production of new crops, to changing crop prices, or to hazards of weather, insects, diseases, and weeds. Crop choices and split cropping on one or more fields give the flexibility that is needed for meeting these problems.[1]

Following are seven other four-field rotations that can be used instead of the rotation of corn, soybeans, wheat, and alfalfa-brome chosen for illustration. They show further how flexible a four-field rotation is.

In Rotations 4 to 7 the fields have been split some years to permit two different crops to be grown.

Other Four-Field Rotations

1	Corn	Corn	Oats	Sod
2	Corn	Soybeans	Oats	Sod
3	Corn	Soybeans	Wheat	Sod
4	Corn	Corn-soybeans	Oats	Sod
5	Corn	Oats-soybeans	Wheat	Sod
6	Corn	Soybeans	Oats-wheat	Sod
7	Corn	Corn-soybeans	Oats-wheat	Sod

(Sod here = mixed legumes and grasses.)

Other rotations than the four-field cropping system can be used. One possibility is a three-year rotation of corn, soybeans, wheat (or oats), with a legume catch crop seeded in the small grain (*see* Table 2). According to current information, such a rotation will give yields comparable to those with a standover legume sod, *provided the proper fertilization is used.* Under normal farming practices, the more intensive rotation will need relatively heavier fertilization to keep yields at a high level than rotations having standover legumes. Also, when rotations include only legume catch crops the plowed layer of soil tends to become more compact and less porous than when standover legumes are included.

For rolling land it is better to plan longer rotations and put more of the land in sod crops. A rotation such as corn, oats, sod, sod, sod has merit as an erosion-control cropping system.

Suit rotations to your conditions. Tables 2 and 3 show the most intensive crop rotations suitable for soils in Macon county under varying conditions. Table 2 applies to the dark-colored soils of Areas H, K, and R, as shown on the Soil Association Map, Fig. 1, while Table 3 applies to the light-colored soils of Areas I, L, and Rx.

The rotations in these tables are based upon the assumption that the farm operator is following sound soil- and crop-management practices. If the soil is not fertilized according to needs indicated by soil tests, the rotations may not adequately control erosion. This will be especially true where the meadow crops fail or make poor growth for lack of proper nutrients. Also, erosion will not be adequately controlled where meadow crops are harvested excessively or are overgrazed or where other crop residues are removed or burned.

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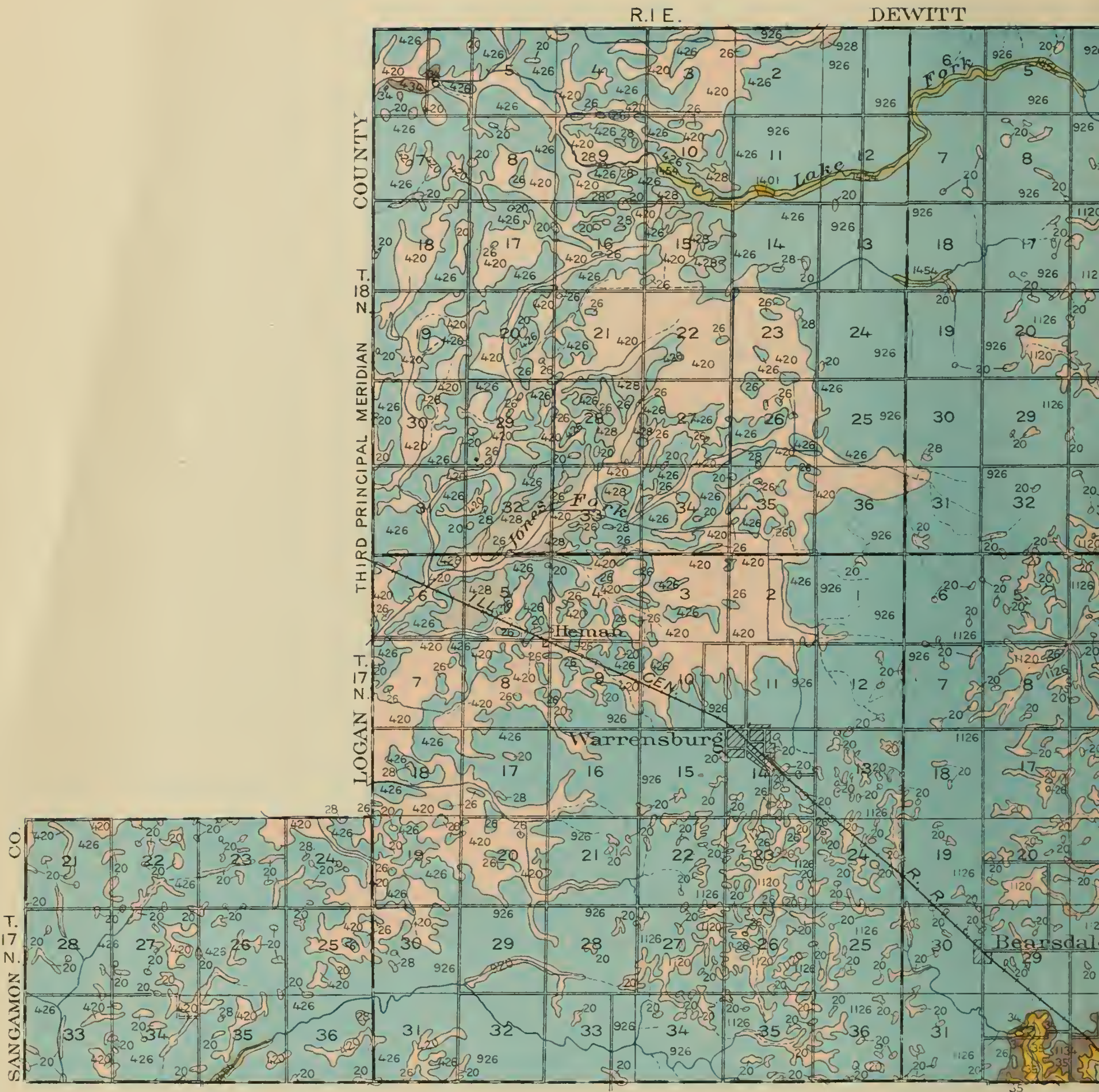
[1] The subject of crop rotations is discussed in more detail in the U. S. Department of Agriculture Yearbook for 1938, pages 406-430, the Yearbook for 1943-1947, pages 527-536, and in the Yearbook for 1948, pages 191-202.



LEG

400 Middle Illinoisan glaciation

900 Early Wisconsin moraines

1100 Early Wisconsin intermorainal area

Scale
0 1/4 1/2 1 2 Miles

(a) UPLAND PRAIRIE SOILS

26	Brown silt loam
20	Black clay loam
28	Brown-gray silt loam on tight clay
60	Brown sandy loam

(b) UPLAND TIMBE

34	Yellow-gray silt l
35	Yellow silt loam
64	Yellow-gray sand
65	Yellow sandy loa

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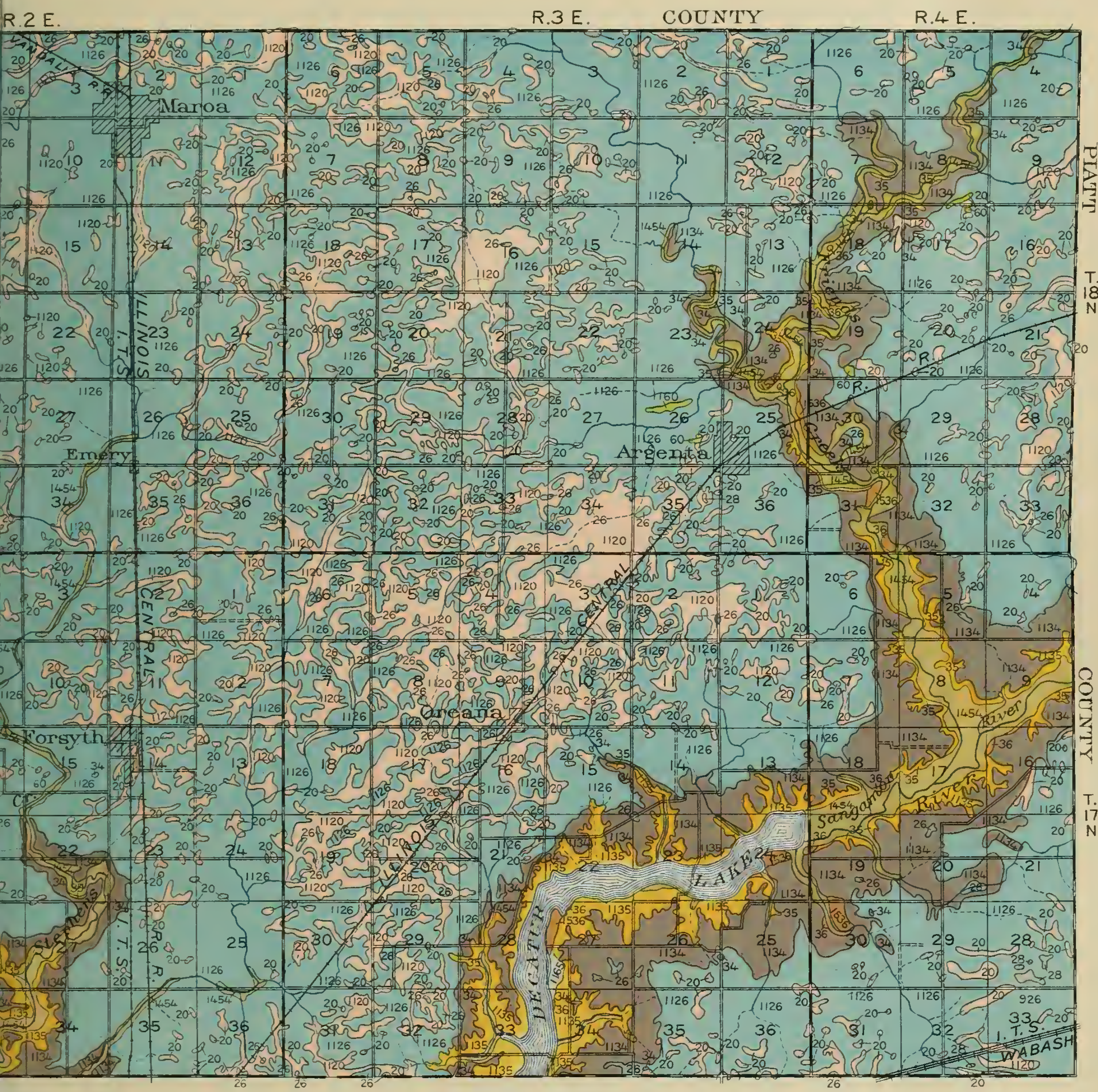

END

OILS

(c) TERRACE SOILS

1527	Brown silt loam over sand or gravel
36 / 1536	Yellow-gray silt loam over sand or gravel
66 / 1566	Brown sandy loam over sand or gravel

(d) LATE SWAMP AND BOTTOM-LAND SOILS

1401	Deep peat
1426	Deep brown silt loam
54 / 1454	Mixed loam

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OF MACON COUNTY

LTURAL EXPERIMENT STATION

Table 2. — MOST INTENSIVE CROP ROTATIONS RECOMMENDED WITH DIFFERENT CONSERVATION PRACTICES FOR DARK-COLORED SOILS (Areas H, K, and R in Macon County)

Slope (percent)	Depth to subsoil (inches[a])	No practices (Slopes 200 to 300 feet long)	Contouring (Slopes 200 to 300 feet long)	Strip cropping (Slopes 200 to 300 feet long)	Terracing
0 to 2	Over 7	R-R-G-M[b] *or* R-R-G (leg.)[c] (Drainage often needed)	. . . .	. . . .	. . . .
2 to 4	Over 7	R-R-G-M-M	R-R-G-M	R-R-G-M (100)[d]	R-R-G-M (100)[e]
	Under 7	R-G-M[f]	R-R-G-G-M	R-R-G-M (100)	R-R-G-M (100)
4 to 6	Over 7	R-G-M-M	R-R-G-M-M	R-R-G-M (90)	R-R-G-M (90)
	Under 7	R-G-M-M-M	R-G-M[f]	R-R-G-M-M (90)	R-R-G-G-M (90)
6 to 8	Over 7	R-G-M-M-M	R-G-M[f]	R-G-M[f] (80)	R-R-G-M (80)
	Under 7	R-G-M-M-M-M	R-G-M-M	R-G-M-M (80)	R-R-G-G-M (80)
8 to 10	Over 7	R-G-M-M-M-M	R-G-G-M-M	R-G-G-M-M (70)	R-R-G-M-M (70)
	Under 7	G-M-M-M-M	R-G-M-M-M	R-G-M-M-M (70)	R-G-M[f] (70)
10 to 14	Over 7	G-M-M-M-M	R-G-M-M-M-M	R-G-M-M-M-M (60)	R-G-M-M (60)
	Under 7	PERMANENT	G-M-M-M-M	G-M-M-M (60)	R-G-M-M-M (60)
14 to 18	Over 7		PASTURE	G-M-M-M-M (50)	
	Under 7				
Over 18	. . . .			OR WOODS	

[a] If ordinary plowing does not expose any subsoil, more than 7 inches of surface probably remains. If plowing does turn up occasional chunks of subsoil, something less than 7 inches of surface is left. On severely eroded areas where the subsoil is exposed, use a long rotation with cover crops predominating, or plant to permanent sod or woods.

[b] Letters have the following meanings: R = row crops such as corn and soybeans; G = small grain such as oats and wheat; M = meadow or rotation hay or pasture made up of one or more of the legumes or grasses or a suitable combination. For example, the rotation R-R-G-M includes two years of row crops, one year of small grain, and one year of sod in a four-year period.

[c] Intensive grain rotations with catch-crop legumes such as corn, corn, oats (legume catch crop) or corn, soybeans, wheat (legume catch crop) can be used satisfactorily on nearly level, permeable, dark-colored soils such as Flanagan, Brenton, Ipava, Drummer, and Illiopolis (see Table 4, page 14, and text table, page 20). Under normal farming practices, however, the plowed layer of soil tends to become more highly compacted and less porous when only legume catch crops are in the rotation than when standover legumes are included.

[d] Figures in parentheses are maximum recommended width of crop strips in feet.

[e] Figures in parentheses are maximum recommended width of terrace spacings in feet.

[f] Rotation R-G-G-M or R-R-G-M-M-M may be substituted for rotation R-G-M.

It should be noted that the recommended rotations are only for slopes between 200 and 300 feet long. While more intensive rotations can be used on shorter slopes, less intensive rotations *must* be used on longer slopes to guard against excessive soil losses. Also, even on slopes shorter than 300 feet, rotations with more forage crops than those listed in Tables 2 and 3 are recommended where such crops can be used profitably or where more effective erosion control is desired.

Consult your farm adviser or Soil Conservation Service technician for other recommendations if conditions on your farm are different from those given here.

Protect Soil Against Erosion

Erosion control is not a major problem throughout large portions of Macon county. Except on the Shelbyville and Cerro Gordo moraines in Area H_2 (Fig. 1) and on the bluffs of Sangamon river and its tributaries in Area I, little of the land surface slopes more than 3 percent.

Although gentle slopes of only 1½ to 2 percent are subject to some soil loss, good farming methods will usually give satisfactory control on such slopes. These

Table 3. — MOST INTENSIVE CROP ROTATIONS RECOMMENDED WITH DIFFERENT CONSERVATION PRACTICES FOR LIGHT-COLORED SOILS (Areas I, L, and Rx in Macon County)

Slope (percent)	Depth to subsoil (inches[a])	No practices (Slopes 200 to 300 feet long)	Contouring (Slopes 200 to 300 feet long)	Strip cropping (Slopes 200 to 300 feet long)	Terracing
0 to 2	Over 7	R-R-G-M-M[b] (Drainage may be needed)	...	...	...
2 to 4	Over 7	R-G-M[c]	R-R-G-M-M	R-R-G-M (100)[d]	R-R-G-M (100)[e]
	Under 7	R-G-M-M	R-G-M[c]	R-G-M[c] (100)	R-G-M[c] (100)
4 to 6	Over 7	R-G-G-M-M	R-G-M-M	R-R-G-M-M (90)	R-R-G-M (90)
	Under 7	R-G-M-M-M-M	R-G-M-M-M	R-G-M[c] (90)	R-G-M[c] (90)
6 to 8	Over 7	R-G-M-M-M-M	R-G-M-M-M-M	R-G-M[c] (80)	R-R-G-G-M (80)
	Under 7	G-M-M-M-M	G-M-M-M	R-G-M-M (80)	R-G-M[c] (80)
8 to 10	Over 7	G-M-M-M-M	G-M-M-M	R-G-M-M-M (70)	R-G-M[c] (70)
	Under 7		G-M-M-M-M	R-G-M-M-M-M (70)	R-G-M-M (70)
10 to 14	Over 7		G-M-M-M-M	R-G-M-M-M-M (60)	R-G-M-M-M (60)
	Under 7	PERMANENT		G-M-M-M (60)	R-G-M-M-M-M-M (60)
14 to 18	Over 7		PASTURE	G-M-M-M-M (50)	
	Under 7				
Over 18	...			OR	WOODS

[a] If ordinary plowing does not expose any subsoil, more than 7 inches of surface probably remains. If plowing does turn up occasional chunks of subsoil, something less than 7 inches of surface is left. On severely eroded areas where the subsoil is exposed, use a long rotation with cover crops predominating, or plant to permanent sod or woods.
[b] Letters have the following meanings: R = row crops such as corn and soybeans; G = small grain such as oats and wheat; M = meadow or rotation hay or pasture made up of one or more of the legumes or grasses or a suitable combination. For example, the rotation R-R-G-M includes two years of row crops, one year of small grain, and one year of sod in a four-year period.
[c] Rotation R-G-G-M or R-R-G-M-M-M may be substituted for rotation R-G-M.
[d] Figures in parentheses are maximum recommended width of crop strips in feet.
[e] Figures in parentheses are maximum recommended width of terrace spacings in feet.

methods include the use of limestone and fertilizers according to soil test, the use of a well-chosen cropping system, and good cultural practices.

It is on slopes greater than 2 percent particularly, that many or all of the following practices may be needed: (1) liming and fertilizing in such a way as to encourage vigorous plant growth, (2) leaving a vegetative covering on the surface as much of the time as practicable, (3) disking into the surface or plowing down all crop residues, (4) plowing in the spring rather than in the fall, (5) maintaining permanent well-sodded waterways, and (6) planting clean-tilled row crops on the contour (in terrace strips or alternating strips with small grains and legume-grass sod) where advisable.

The effect of contour farming in contrast to farming up and down the slope was tested on four plots of Flanagan silt loam on a 2-percent slope at Urbana. The plots were 53½ feet wide and 180 feet long, with all runoff water from above shunted to the side. They were laid out in 1941 and cropped to corn and oats (with a sweet clover catch crop) through 1944. Alternating crops of corn and soybeans have been grown since 1944, with two plots farmed on the contour and two farmed up and down the slope. Before 1941 limestone and rock phosphate in excess of the needs indicated by soil tests had been applied. Beginning in 1947, nitrogen, phosphorus, and potassium fertilizers were applied each year in excess of crop needs. Following are the results that were obtained from 1945 through 1951:

	Corn		Soybeans	
	Contour farmed	*Farmed up and down*	*Contour farmed*	*Farmed up and down*
Average yearly water losses per acre (in.)[a]	1.08	2.19	0.37	2.28
Average yearly soil losses per acre (tons)	1.15	2.79	0.46	2.26
Average yearly crop yields per acre (bu.)	109.0	106.2	30.3	28.9

([a] Average yearly rainfall 1945 through 1951 was 37.8 inches.)

The soil and water losses were significantly greater on the noncontoured plots than on the contoured ones, but they cannot be considered excessive on any of the plots. Although there are differences in corn and soybean yields between the contoured and noncontoured plots, they are not large. From these results we may conclude that contour farming usually is not necessary on dark-colored, permeable soils in Macon county when the slopes are 2 percent or less in steepness and less than 200 feet long. We may also conclude, however, that contour farming is desirable on longer or steeper slopes, since even on the short, gentle slopes contouring somewhat increased yields and appreciably decreased soil and water losses.

Use Good Tillage Practices

The soil must not be plowed or cultivated too often if it is to be kept in good physical condition and thus capable of producing maximum yields. Also, it should be plowed only when moisture conditions are right, and, if the land is sloping, it should be plowed in the spring rather than in the fall.

The once good physical condition of many of our soils has deteriorated to the danger point. This is true of our lighter silt loams as well as of the heavier silty clay loams and the clay loams. Deterioration of this kind is gradual and not easily noticed. Many farmers do not become aware of it until most of the damage is done: Then the soils are difficult to work, underdrainage is slow, and "wet spots" develop.

This is all the result of a poor cropping system which includes too many row crops that require frequent cultivation and not enough legumes and grasses. Such a system breaks down the structure of the surface soil and leads to the development of compacted layers in the soil.

While deep tillage helps to break up such compact, slowly permeable layers, it is expensive and no one knows how long the good results will last on various types of soil. The best and probably the only way to maintain good physical condition in the surface and subsurface soil is to follow these steps:

1. Include plenty of grasses and legumes in the rotation. While the soil is in legumes and grasses it gets a rest from the excessive cultivation that is necessary when row crops are grown year after year. Furthermore, as already mentioned (page 7), deep-rooting legumes will help to break up the compacted layer beneath the surface soil; and fibrous-rooted grasses, together with the legumes, will help to develop and maintain a granular structure in the surface soil.

2. Turn down all crop residues.

3. Till at the right time and season. As already mentioned, sloping land should be plowed in the spring, and all land should be plowed only when it is

neither too wet nor too dry. Plowing when the soil is too wet destroys the granular structure. Plowing when the soil is too dry isn't so bad, but it still isn't recommended because of the big dry chunks that result.

For further information on the importance of good tillage practices, see Illinois Circular 655, "Tilth of Corn-Belt Soils."

WORK OUT A DETAILED PROGRAM

Field Boundaries May Have to Be Changed

On most farms in Macon county fences and field boundaries follow straight lines which have no relation to soil types or slopes. These straight boundaries are an advantage on nearly level areas where the various soil types have similar use-and-management requirements. In the more rolling parts of the county, however, field boundaries must be changed to conform with soil types and slopes if the land is to remain permanently productive.

Many fields, especially in the rolling areas, contain two or more soils that call for widely different management and different kinds of crops. If the area of one soil type is very small, it usually has to be farmed in the same way as the adjacent area. Often, however, the areas of the different types are large enough that rotations can be split or field boundaries rearranged to allow each type to be devoted to its own best permanent use.

More Than One Cropping System May Be Needed

Usually several good field arrangements and cropping systems can be worked out for any given farm. Some farms may require two or more different cropping systems. For example, a farm that includes bottomland, rolling upland, and level upland may require three different crop rotations if these three kinds of land are to be used to best advantage. The three crop rotations must be coordinated, of course, to make an efficient cropping system for the farm as a whole.

Include Good Management Practices

The various points of good soil management — adequate drainage; testing for acidity, phosphate, and potash; application of limestone and fertilizers; selection of a good crop rotation to provide organic matter and nitrogen; protection against erosion; and good tillage practices — should be considered carefully in developing the plan.

Put Plan Into Operation

As soon as a definite, well-coordinated crop and soil-management plan has been completed, it should be put into operation. There is no regular order, however, in which changes should be made, since conditions vary considerably from farm to farm. If drainage is not adequate, this condition must first be corrected before the best returns can be obtained from a good crop rotation and soil treatment. Also, on acid soils it is necessary to apply limestone before a good

rotation, including the proper kind and acreage of deep-rooting legumes, can be adopted. On acid soils, therefore, limestone should be applied early in the soil-improvement program.

Keep Plan Up-to-Date

It is important to keep in touch with the latest information on cropping practices and soil treatments. Your farm adviser will be glad to help you plan a good crop- and soil-management program for your farm and keep it up to date.

UPLAND PRAIRIE SOILS

Brown silt loam (26, 426, 926, 1126 on old soil map)

Now subdivided into:

Flanagan silt loam (154) Catlin silt loam (171) LaRose silt loam (60)	*in Area H, Fig. 1*	Ipava silt loam (43) Bolivia silt loam (246) Tovey silt loam (247) Assumption silt loam (259)	*in Area K, Fig. 1*

Brenton silt loam (149) Proctor silt loam (148)	*in Area R, Fig. 1*

Flanagan silt loam (154) is a dark soil derived from 3½ to 6 feet of loess on permeable calcareous (limey) glacial till. It occurs on slopes ranging from ½ to about 3 percent. It is the major brown silt loam soil in Area H_1 (Fig. 1) and also occurs in Area H_2 although it is less extensive there than is Catlin silt loam.

The surface is a dark-brown silt loam 8 to 10 inches thick. It is high in organic matter and usually high in available potassium. The total content of nitrogen is high, but regular additions should be made to maintain an adequate supply of readily available nitrogen. On the average in untreated fields, the surface is low to slight in available phosphorus and medium acid.

The subsurface is a brown silt loam. Beginning at a depth of 14 to 18 inches, the subsoil is a yellowish-brown to grayish-brown silty clay loam, usually spotted with brown, brownish-yellow, and some gray. Below 30 inches the subsoil often is more gray and more strongly mottled.

Free carbonates are usually present in the loess at a depth of 45 to 50 inches and in the till immediately beneath the loess. The till is of a loam texture and is permeable to both water and plant roots.

Flanagan silt loam is very productive when well managed (Table 4). Erosion is a problem only on unprotected slopes greater than 2 percent. Even on these slopes, it can be successfully controlled by the proper use of cover crops, crop residues, mulches, or other adapted erosion-control practices. Drainage is needed on the more level areas but the subsoil is permeable and tile draw freely. Each field should be tested for limestone, phosphate, and potash needs and the materials applied as needed. Liberal applications of manure keep available potassium at a high level and furnish some phosphorus and nitrogen. Supplementary phosphorus must be added, however, where large crops are removed. Either rock phosphate or superphosphate is satisfactory on this soil.

Table 4. — AVERAGE ACRE YIELDS OF CORN

On the Morrow Plots, Urbana, Located on Flanagan Silt Loam, 1940-1952

(Plots established in 1876; present cropping and fertilizer practices in operation since 1904; hybrid corn grown since 1943)

Plot and rotation	Yields of corn with— No treatment, crop residues removed	Yields of corn with— Manure-limestone-phosphate treatment[a]	Increases for treatment
	bu.	*bu.*	*bu.*
Plot 3—continuous corn (13 crops)	20.8	60.6	39.8
Plot 4—corn-oats rotation (6 crops)	31.8	94.2[b]	62.4
Plot 5—corn-oats-red clover rotation (5 crops)	62.0	99.5	37.5
Increases for rotation:			
Corn-oats over continuous corn	11.0	33.6	....
Corn-oats-clover over continuous corn	41.2	38.9	....
Corn-oats-clover over corn-oats	30.2	5.3	....

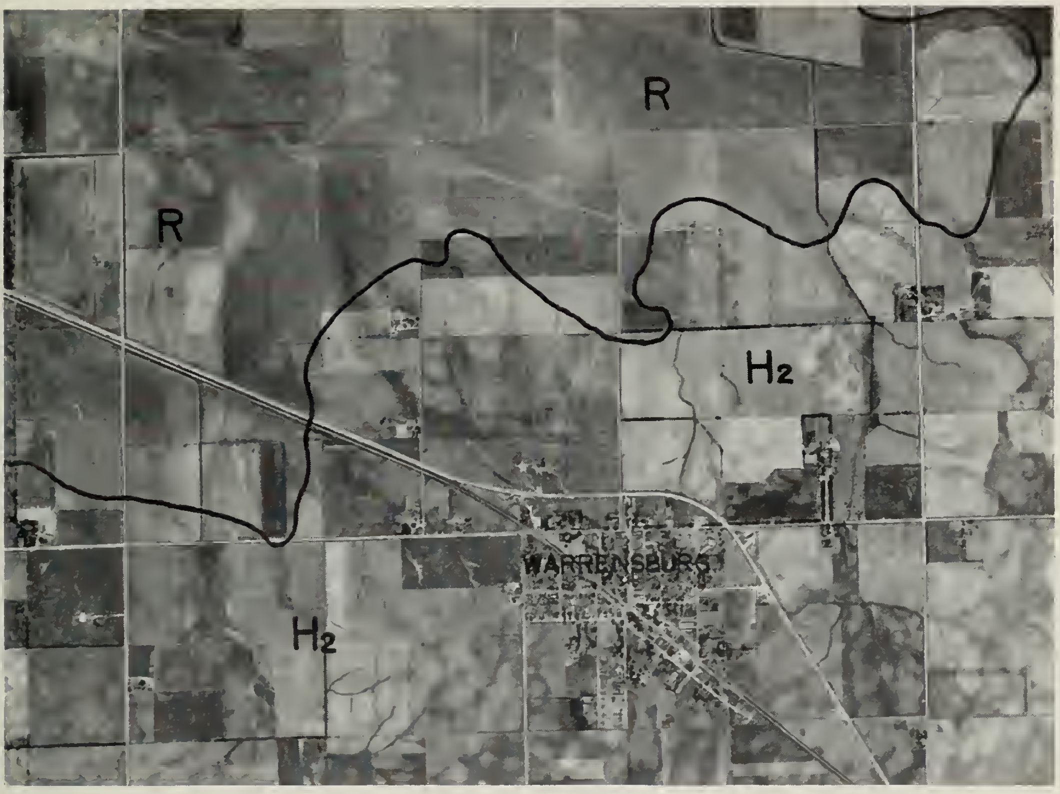
[a] Since 1904 the south half of each plot has received manure equal to dry weight of crops removed; limestone equal to an average of about 370 pounds per acre per year. From 1904 to 1925 the southeast quarter of each plot received an average of 157 pounds of bone phosphate per acre per year; the southwest quarter, 629 pounds of rock phosphate. All crop residues except legume catch-crop on Plot 4 are removed.
[b] Sweet clover or alfalfa is seeded in the oats on the treated half of Plot 4 and plowed under as green manure.

A four-year rotation with two years of row crops such as corn and soybeans, one year of small grain, and one year of standover legume-grass sod is well suited for Flanagan soils (Table 2). The sod helps to maintain a desirable physical condition and, when plowed under as a green manure, provides nitrogen and other available plant nutrients. It can also be used to good advantage as pasture, hay, or possibly as a legume- or grass-seed crop.

Intensive grain rotations with catch crop legumes, such as corn, soybeans, wheat (with legume catch crop) or corn, corn, oats (with legume catch crop), can probably be used more satisfactorily on the darker silt loam soils such as Flanagan, Brenton, and Ipava than on any other soils in Macon county, including the heavier textured soils such as Drummer, Harpster, Illiopolis, and Peotone which have less favorable physical properties. However, fields farmed to the intensive grain rotations will need somewhat heavier fertilization than those where a rotation with a standover legume is used.

Catlin silt loam (171) is a dark soil formed from 3½ to 5 feet of loess on permeable calcareous till of loam texture. It occurs on slopes of about 3 to 7 or 8 percent and is better oxidized and better drained than Flanagan. It is a minor type in Area H_1 (Fig. 1) occupying the few small knolls and narrow ridges or other slopes of 3 to 7 percent that occur in those areas. It is the most extensive soil in the H_2 areas making up the Cerro Gordo moraine in the eastern part of Macon county and the Shelbyville moraine which extends in a general north-south direction across the west-central part of the county (Fig. 1).

The surface is a brown to light-brown silt loam 6 to 8 inches thick. It is moderately high in organic matter, nitrogen, and available potassium. Where untreated it is low to medium in available phosphorus and about medium acid.



A small portion of Macon county at Warrensburg as seen from the air. A different soil pattern is shown in the rolling ridge-like H_2 area (known as Shelbyville moraine) in the southeastern section of the picture than in the nearly level outwash plain or R area in the northwestern part.

The moraine or H_2 area is underlain at depths of about 2 to 6 feet by calcareous glacial till of loam texture, and the soil types are primarily LaRose, Catlin, and Flanagan silt loams. The light areas indicate some erosion with a slight concentration of sand and pebbles on the surface.

The outwash plain or R area is underlain at depths of 4 to 6 feet by waterlaid sandy and silty sediments, and the soil types are primarily Brenton silt loam and Drummer silty clay loam. The light-colored streaks in this area are due to recently deposited overwash eroded from the steeper slopes in the moraine. The lighter shadings with a more rounded and spotty outline are gray spots of Thorp and Brooklyn silt loam soils.

Note that the drainageways which show prominently in the H_2 area tend to fade and mostly disappear in the R area except where there is a dredged channel. (Fig. 3)

The subsurface is a yellowish-brown silt loam. The subsoil, which begins at a depth of 12 to 16 inches, is a yellowish-brown silty clay loam. A few brownish or grayish mottlings occur in some places in the lower subsoil. The underlying loess is usually leached of free carbonates and sometimes a few inches of the glacial till is also leached.

Catlin is a fairly productive soil when well managed and not severely eroded. It is naturally well drained, so that tile are not needed except perhaps in a few seepy spots on some of the slopes.

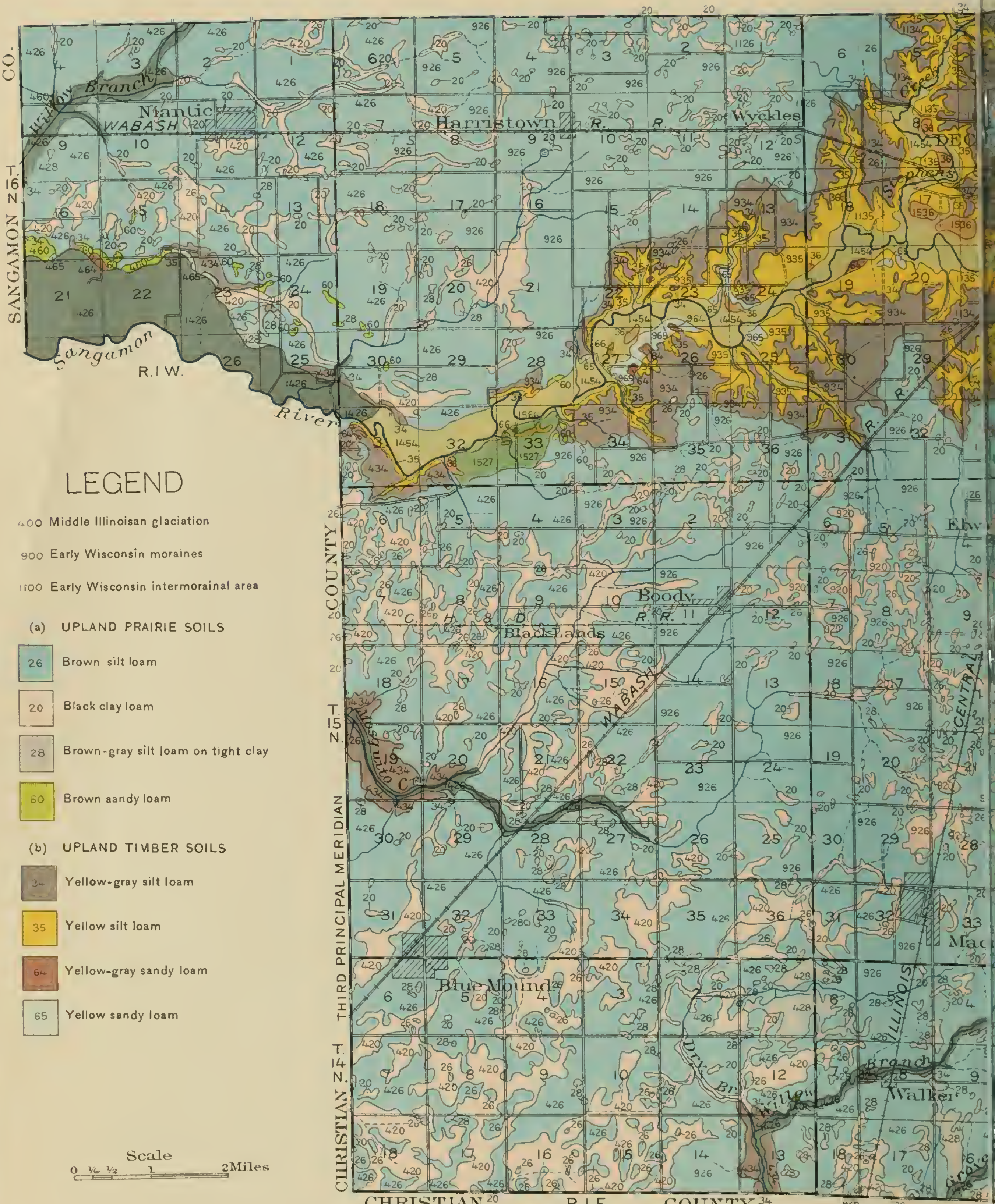
Since the soil occurs on rolling topography, erosion is a serious hazard, reducing the productivity of many crops, particularly corn and soybeans, if not controlled (Fig. 4). To keep erosion at a minimum, the rotation should include

Here a field of Catlin silt loam is gradually being ruined by up-and-down-hill cultivation and by unsodded waterways. Fields like this are slowly but surely losing their productive dark-colored surface layer of silt loam, cultivation is becoming more difficult, and crop yields are decreasing. (Fig. 4)

a standover legume-grass sod every third or fourth year. Also such erosion-control practices as contour cultivation (Fig. 5), strip cropping, and terracing should be used to hold as much soil material in place as possible. In general the more erosion-control practices that are in use, the more corn and soybeans can be permitted in the cropping system without serious soil loss (Table 2).

Soil tests should be made, and the necessary amounts of limestone, phosphate, and potash applied.

Farming on the contour is recommended for all slopes that have a gradient of more than 2 feet in a hundred. Sometimes strip cropping and well-constructed and properly maintained terraces are needed to supplement contour cultivation. Well-sodded waterways are also important in slowing runoff and reducing soil losses by erosion. (Fig. 5)



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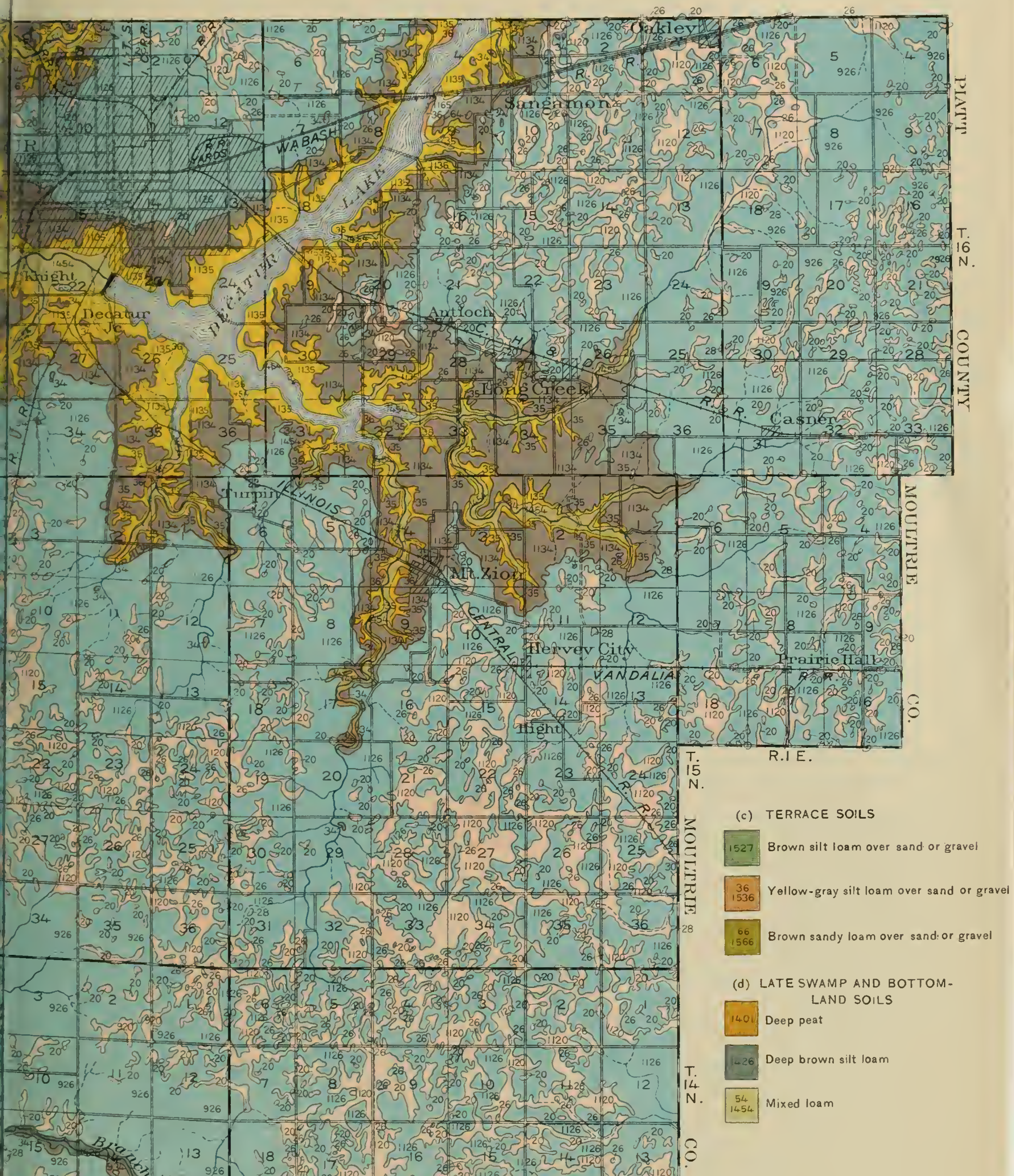

OF MACON COUNTY

ULTURAL EXPERIMENT STATION

LaRose silt loam (60) is a moderately dark soil similar to Catlin except that it occurs on somewhat steeper slopes, which usually vary between about 5 and 12 percent, and the loessial material is less than 3½ feet thick. A very minor type in the H_1 areas (Fig. 1), it occurs only on the steeper slopes along some of the streams. It is somewhat more extensive in the H_2 areas, where topography is more rolling, but is less extensive than Catlin.

The surface is a brown to light-brown silt loam, 6 to 8 inches thick where erosion has not been severe. It is moderately high in organic matter, nitrogen, and available potassium. Where untreated it is low to slight in available phosphorus and medium acid.

The subsurface is a yellowish-brown silt loam. The subsoil begins at a depth of 12 to 16 inches and is a yellowish-brown silty clay loam. Some sand grains and small pebbles are present in the lower subsoil; in fact, they may occur throughout the profile and on the surface, especially where there has been much erosion.

Surface drainage or runoff is rapid to excessive, and erosion is often severe following cultivation. A crop rotation which includes a standover legume-grass sod at least half of the time and a clean cultivated crop not more than a fourth of the time is recommended to prevent excessive soil losses by erosion. If a greater proportion of corn is needed, all farming should be on the contour, and possibly also strip cropping and terraces should be used (Table 2). The soil tests should be made and limestone, phosphate, or potash applied according to the results.

Ipava silt loam (43) is a dark soil derived from 6 to 7 feet of loess on slowly permeable noncalcareous glacial till. It occurs on slopes of about ½ to 1 percent, occupying low knolls in broad nearly level areas or the very gently sloping bases of higher knolls and ridges. It is found in the K areas in the northwestern, western, and southwestern parts of the county.

The surface is a dark-brown heavy silt loam 10 to 12 inches thick. It is high in organic matter, nitrogen, and available potassium; low to medium in available phosphorus; and about medium acid. The subsurface is a brown silt loam. Beginning at a depth of 16 to 18 inches, the subsoil is a somewhat compact and plastic grayish-brown heavy silty clay loam strongly mottled with yellowish-brown and gray. Beneath the subsoil there are usually a few inches of leached silt loam, with free carbonates present in the loess at a depth of 45 to 50 inches.

Under good management, Ipava is a productive soil. Erosion is not a hazard. Drainage is needed, but the subsoil is permeable enough that tile draw well. Limestone, phosphate, and potash should be applied according to the needs indicated by soil tests. The crop rotation should include a deep-rooting legume or legume-grass sod on each field once every fourth year or a legume catch crop every third year (Table 2).

Ipava is similar in many respects to Flanagan silt loam (154), except that Ipava is underlain by leached, slowly permeable glacial till rather than by calcareous, moderately permeable glacial till, and is usually limited to slopes of less than 2 percent. Ipava requires approximately the same treatment and management as Flanagan (page 13).

Bolivia silt loam (246) is a dark soil derived from 5 to 7 feet of loess on strongly weathered, slowly permeable glacial till. Of major importance in the K

areas (Fig. 1), it occurs on slopes of 1 to 3 percent or on gently sloping knolls and ridges.

The surface is a brown to dark-brown silt loam 8 to 12 inches thick. It is high in organic matter, nitrogen, and available potassium. Where untreated it is low to medium in available phosphorus and medium acid. The subsurface is a yellowish-brown silt loam. The subsoil begins at a depth of 16 to 18 inches. It is a dark yellowish-brown silty clay loam mottled with yellowish-brown, brown, and gray, particularly in the lower part. Beneath the subsoil, the silt loam loessial material is noncalcareous to about 4 feet. Free carbonates are usually present at a depth of 50 to 55 inches.

Bolivia silt loam is a productive soil when well treated. Drainage is seldom needed since there is enough slope that water does not stand on the surface. Erosion is a slight hazard on the 2- to 3-percent slopes. It can usually be controlled, however, by a good crop rotation which includes no more than one clean-tilled crop (corn or soybeans) every three years, along with good cover crops and surface mulches of crop residues and manures. If a more strenuous rotation is used on slopes greater than 2 percent, contour tillage and grass waterways are recommended.

A standover legume-grass sod in the rotation will help to keep the soil in good physical condition. Limestone, phosphate, and potash should be applied according to the needs indicated by soil tests.

Tovey silt loam (247) is a moderately dark soil derived from 4 to 7 feet of loess on weathered till. It occurs in Area K (Fig. 1) on slopes of 3 to 7 percent — in other words on topography which, generally speaking, is intermediate in steepness between that of Bolivia and that of Assumption.

The surface is a brown to light-brown silt loam, 5 to 8 inches thick, which is moderately high in organic matter, nitrogen, and available potassium. Where untreated it is low to medium in available phosphorus and medium acid. The subsurface is a yellowish-brown silt loam, while the subsoil, which begins at a depth of 14 to 16 inches, is a yellowish-brown silty clay loam. Beneath the subsoil there are several inches of noncalcareous silt loam material, below which is weathered, moderately plastic till.

Tovey silt loam is a fairly productive soil if it is well managed and is not already severely eroded. Surface runoff is rapid so that drainage is not needed except in seepy spots. Erosion is a serious problem and every effort should be made to hold it to a minimum because it reduces the productivity of the soil. Soil tests should be made and limestone, phosphate, and potash applied as needed. A crop rotation should be used in which a standover legume-grass sod appears one or more times every three or four years. Such additional erosion-control practices as contour cultivation, strip cropping, or terracing should also be used as needed to reduce the amount of soil loss (Table 2).

Assumption silt loam (259) is a moderately dark soil formed from about 1½ to 4 feet of loess on weathered, moderately sticky glacial till. This soil occupies slopes of 5 to 12 percent or more in association with Tovey silt loam. A minor type in Macon county, it occurs in the K areas (Fig. 1) primarily on the steeper slopes along the smaller streams.

The surface is a light-brown silt loam, 5 to 8 inches thick when not severely

eroded. It is moderate to moderately high in organic matter, nitrogen, and available potassium; low to medium in available phosphorus; and about medium acid. The subsurface is a brownish-yellow silt loam. The subsoil, which begins at a depth of 10 to 14 inches, is a yellowish-brown silty clay loam. Brown and gray mottlings frequently appear in the lower subsoil as a result of restricted under-drainage caused by the underlying till. Some sand grains and a few small pebbles may also be found.

Assumption is not a good soil for general farming. Surface runoff is rapid to excessive and erosion is severe following cultivation. Most of the type is made up of rather short slopes so that strip cropping and terracing cannot be used effectively. Many areas should be used only for hay and pasture.

Brenton silt loam (149) is a dark soil formed from 3½ to 6 feet of silty material on mixed or stratified silts, sands, and gravels. It is a moderately extensive type in Macon county, occupying a considerable acreage of Area R. It also occupies a portion of Area Y northwest of Boody, which is shown on the old soil map as Type 1527 (*see* also page 28).

In many respects Brenton is similar to Flanagan silt loam (154) except that Brenton is underlain by stratified outwash sands and silts rather than calcareous glacial till and it is usually limited to slopes of less than 2 percent. Brenton should be treated and managed about the same as Flanagan (page 13).

Proctor silt loam (148) is a dark soil formed from 3 to 6 feet of silty material on mixed silts, sands, and gravels. It occurs in association with Brenton silt loam (149) but occupies a somewhat greater range in slope — from 0 to 4 or 5 percent. It is more brown throughout the surface and subsoil and is better drained than Brenton.

Proctor is similar in many respects to Catlin silt loam (171) except that Proctor is underlain by stratified outwash sands and silts rather than unstratified till and it usually occurs on gentler slopes. The treatment and management requirements of Proctor are similar to those for Catlin (page 14) except that erosion is a less serious problem on Proctor.

Black clay loam (20, 420, 920, 1120 on old soil map)

Now subdivided into:

Drummer silty clay loam (152) — *in Areas H and R, Fig. 1*

Illiopolis silty clay loam (65) — *in Area K, Fig. 1*

Harpster silty clay loam (67)
Peotone silty clay loam (330) } *in Areas H, K, and R, Fig. 1*

Drummer silty clay loam (152) is a very dark soil derived from 4 to 6 feet of mixed loess and wash material on permeable, calcareous till or stratified outwash deposits. It occupies broad, nearly level areas and slight depressions in the H_1 and R areas (Fig. 1) where it is an important soil type. It also occurs in slight depressions and along some of the drainageways in the H_2 areas, where it is a type of minor importance.

The surface is a black silty clay loam 10 to 14 inches thick, which is high in organic matter, nitrogen, and possibly available potassium. In untreated fields

it may vary from low to high in available phosphorus, depending on past cropping practices. It also varies from medium acid to neutral. The subsurface is a very dark gray silty clay loam. The subsoil, which begins at a depth of about 15 to 18 inches, is a dark gray silty clay loam mixed and mottled with yellowish-brown, pale yellow, and gray.

Drummer is highly productive when well drained and properly managed. Drainage is needed in all areas of this soil, and tile will draw well where good outlets are provided. Tile should be kept above any loose sandy layers that may occur in this soil, especially in Area R; otherwise they are apt to get out of line and fail to function.

Each field should be tested for acidity, available phosphorus, and potassium, and the needed materials applied as soon as practicable. Superphosphate may be more efficient than rock phosphate in correcting any phosphorus deficiency, especially where the soil is not acid.

The crop rotation should include a standover legume or legume-grass sod crop on each field once every four years or a legume catch crop once every three years (Table 2). When plowed under as a green manure, this legume crop not only furnishes nitrogen and other organic plant nutrients for high corn production, but also helps to maintain the soil in a desirable physical condition. This latter point is of great importance on a soil with a heavy-textured surface such as Drummer. Spring plowing of the green manure crop is recommended rather than fall plowing because the new growth decomposes more readily and renewed root growth, especially of sweet clover, is less troublesome. (At other times, however, fall plowing is probably preferable on Drummer soils, because then they can be worked into a good seedbed much earlier than if plowed in the spring.)

Two different rotations were tried from 1940 through 1951 on soil that was chiefly Drummer at Urbana. The soil had received these treatments on the basis of soil tests: limestone, 2½ tons per acre, 1939 — 1941; rock phosphate, 1 ton per acre, 1944 — 1945; 50-percent potash, 200 pounds per acre for each wheat crop beginning in 1946. Following are the average annual acre yields of the different crops for the 12-year period:

Rotation	*Corn 1st year bu.*	*Corn 2d year bu.*	*Soybeans bu.*	*Winter wheat bu.*	*Red clover tons*
Corn, corn, soybeans, wheat (legume catch crop)[a]	85.7	78.1	33.8	27.1	....
Corn, soybeans, wheat, red clover[b]	91.9	....	33.0	28.6	1.04

[a] Legume catch crop mixture of sweet clover, alfalfa, and red clover seeded in wheat and plowed under as green manure. Cornstalks plowed down throughout entire period; soybean straw and wheat straw, since 1948.
[b] Cornstalks and second growth red clover plowed down throughout entire period; soybean straw and wheat straw, since 1948.

While growing a legume catch crop every four years gave good yields, it is interesting that the corn yields were significantly less than where a standover legume was grown every four years. This may be due either to a smaller amount of nitrogen from the catch crop than from the standover legume or to a less desirable physical condition as a result of the extra plowing and cultivating.

Illiopolis silty clay loam (65) is a very dark, fine-textured soil derived from 6 to 8 feet of loess or mixed loess and silty wash on slowly permeable glacial

till. It occupies the broad nearly level fields and slight depressions in Area K (Fig. 1), where it is an important soil type. Treatment and management practices are the same for Illiopolis as for Drummer soils (discussed above).

Harpster silty clay loam (67) is a very dark soil similar in many respects to Drummer silty clay loam. It differs from Drummer in that its surface is calcareous or highly alkaline as the result of an accumulation of snail shell fragments. It usually occurs as small spots in the Drummer or Illiopolis areas, occupying either slight depressions or slight elevations, or sometimes appearing in narrow bands around the edges of depressions. It is not a very extensive type in Macon county but does need to be recognized because it requires different fertilizer treatment than do the areas adjacent to it.

Adequate drainage is essential to the proper management of Harpster soils. Available potassium is generally low and must be increased for maximum corn and soybean production. Straw, strawy manure, or potash fertilizer may be used to supply the potassium needs. If phosphorus is low, superphosphate should be applied, since rock phosphate is not effective on an alkaline soil such as Harpster. No limestone is needed. A standover legume-grass sod every four or five years will add organic matter and nitrogen, help maintain good soil tilth, and help keep crop yields up.

Peotone silty clay loam (330) is a very dark soil that occurs only in small depressions where water collects and tends to stand. It is similar in profile appearance to Drummer except that it is usually more drab or gray, especially in the subsoil. There are no natural surface outlets to the depressions where Peotone occurs, and crops often drown out before standing water can be removed. Tile draw moderately well but usually not rapidly enough. Surface ditches or open inlets into existing tile lines are often needed to remove excess water. If not adequately drained these spots stay wet longer than adjacent soils and are difficult to farm in a regular rotation with the rest of the field.

Brown-gray silt loam on tight clay (28, 428, 928, 1128 on old soil map)

Now subdivided into:

Thorp silt loam (206)
Brooklyn silt loam (136) } *in Areas H and R, Fig. 1*

Denny silt loam (45) — *in Area K, Fig. 1*

Thorp silt loam (206) is a moderately dark soil which occupies certain nearly level spots or slight depressions in place of Drummer silty clay loam in the H and R areas (Fig. 1). Although more spots of this type occur than are actually shown on the old soil map, it is still not an extensive soil type in Macon county. However, it needs to be recognized because drainage and fertilizer treatment are more important than for many of the other soils.

The surface is a grayish-brown silt loam 6 to 10 inches thick. It is medium in organic matter and nitrogen, medium to high in available potassium, low to medium in available phosphorus, and medium to strongly acid. The subsurface is a brownish-gray to gray silt loam. The subsoil begins at a depth varying from 16

to 24 inches. It is a gray or brownish-gray plastic silty clay, mottled with pale yellow, brown and gray.

Thorp is a moderately productive soil when adequately drained and otherwise well managed. Surplus water must be removed by surface ditches or furrows or by open inlets into tile lines. Tile are usually ineffective without catch basins or open inlets. Soil tests should be made for acidity, phosphorus, and potassium. Since the subsurface is usually more strongly acid than the surface and more deficient in plant nutrients, extra limestone and manure and other fertilizers need to be applied for satisfactory results. When liming and fertilizing a field, it is a good practice to make an extra turn on the spots occupied by Thorp, so that they receive about twice as much material as the rest of the field. Since most of the areas of Thorp are small, they will need to be cropped about the same as the adjacent soils. A standover legume-grass sod should be grown at least once every four years to keep this soil in good physical condition.

Brooklyn silt loam (136) is a dark-gray soil found in Areas H and R (Fig. 1) in association with Thorp silt loam. It is a very minor soil but needs to be recognized because it is more acid and lower in plant nutrient elements than Thorp, and the subsoil is less permeable.

The surface is a brownish-gray silt loam 5 to 7 inches thick. It is moderately low in organic matter and nitrogen, medium to high in available potash, low in available phosphorus, and strongly acid. The subsurface is a light-gray silt loam. The subsoil, which begins at a depth of 16 to 22 inches, is a gray plastic silty clay mottled with pale yellow. Numerous brown iron-manganese pellets or concretions are present on the surface and throughout the soil profile.

Brooklyn silt loam is not very productive. It is difficult to drain adequately. As in Thorp silt loam, surplus water must be removed by surface ditches or furrows or by open inlets into tile lines. Tile without open inlets are not effective. The necessary treatment and cropping programs will be similar to those for Thorp silt loam (above); however, productivity will seldom equal that of Thorp when treatment is the same.

Denny silt loam (45) is a moderately dark soil which occupies small depressional spots in the K areas in place of Illiopolis silty clay loam. Denny is similar to Brooklyn silt loam (136) except that it developed in deeper loess and the material beneath the loess is leached till rather than calcareous till or outwash. It is a very minor type, though more spots occur than are shown on the old soil map. These latter spots are usually less than one acre in size. Treatment and management practices are the same as for Thorp silt loam discussed above.

Brown sandy loam (60, 460, 1160 on the old soil map)

Now subdivided into:

Hagener loamy sand (88)
Onarga sandy loam (150) } *in Areas H and R, Fig. 1*

Hagener loamy sand (88) is a moderately dark sandy soil found mostly in Area R (Fig. 1) on the north side of Sangamon river bottom. It often occurs in close association with Onarga sandy loam and other dark-colored sandy soils. It is a very minor soil in Macon county.

The surface is a brown to light-brown sand to loamy sand 8 to 20 inches thick. It is medium to low in organic matter, nitrogen, and available phosphorus, about medium in available potassium, and medium acid. Beneath the surface to a depth of 4 or 5 feet or more is yellowish-brown to yellow loose sand or fine sand.

Hagener loamy sand is not a good soil for corn or soybeans, and is only fair for wheat and alfalfa. Since it has a low waterholding capacity, it tends to be drouthy for many crops. Heavy applications of manure or other organic matter will improve the moisture-holding capacity somewhat. Leaving crop residues on the surface or applying straw or manure as surface mulches will help check wind erosion and the formation of barren spots or blowouts. Limestone, phosphate, and potash should be applied according to test. Hagener is responsive to good treatment but lack of moisture will usually limit crop yields (*see* Table 1).

Onarga sandy loam (150) is a moderately dark sandy soil found in Area R (Fig. 1) in association with Hagener loamy sand. It also occurs on a very limited acreage of Area H.

The surface is a brown to light-brown sandy loam to fine sandy loam 6 to 8 inches thick. It is medium in organic matter, nitrogen, and available potassium, low to medium in available phosphorus, and medium acid. The subsurface is a brownish-yellow fine sand or loamy fine sand. The subsoil, a yellowish-brown sandy clay loam, begins at a depth of 14 to 18 inches. Beneath the subsoil at 32 to 35 inches is loose yellow to brownish-yellow sand or fine sand.

Onarga is a moderately good soil for most grain and forage crops. It has a higher water-holding capacity than Hagener and therefore is somewhat more drouth-resistant. Wind blowing is also less of a hazard and can be successfully checked by crop residues, manure, or straw mulches. Limestone, phosphate, and potash should be applied according to the needs indicated by soil tests. Onarga is responsive to good treatment, but crop yields are often limited by lack of moisture.

UPLAND TIMBER SOILS

Yellow-gray silt loam (34, 434, 934, 1134 on old soil map)

Now subdivided into:

Birkbeck silt loam (233) Ward silt loam (207) Strawn silt loam (224) Sunbury silt loam (234)	*in Area I, Fig. 1*	Alma silt loam (118) Elco silt loam (119)	*in Area L, Fig. 1*
		Camden silt loam (134) — *in Area Rx, Fig. 1*	

Birkbeck silt loam (233) is a light-colored soil formed from 3½ to 5 feet of loess on permeable calcareous till of loam texture. It occurs on moderately sloping topography, occupying about the same slope range as Catlin silt loam. It is a moderately extensive type in the I areas (Fig. 1).

The surface is a yellowish-gray silt loam which is 5 to 6 inches thick in cultivated fields. It is low in organic matter, nitrogen, and available phosphorus, medium to high in available potassium, and about medium acid. The subsurface is a grayish-yellow silt loam. The subsoil, which begins at a depth of 12 to 15 inches, is a brownish-yellow silty clay loam. Some brownish and grayish mottlings

are present in some places in the lower subsoil. The underlying loess is usually leached of free carbonates, and sometimes a few inches of the glacial till is also leached.

Birkbeck silt loam is a moderately productive soil when properly treated and not severely eroded, but is low to medium in productivity when untreated. Limestone, phosphate, and potash should be applied according to the results of soil tests.

Since Birkbeck is usually well drained, tile are ordinarily not needed except perhaps in seepy spots. Erosion is a serious hazard and should be held to a minimum. A standover legume-grass sod crop should be in the rotation two out of each five years on comparatively gentle, uneroded slopes, and oftener on strongly sloping or eroded areas (Table 3).

Ward silt loam (207) is a light-colored soil derived from 3½ to 6 feet of loess on permeable calcareous glacial till. It occurs on nearly level land or in slight depressions in association with Birkbeck silt loam. Most of the type occurs near Decatur and to the northeast on the upland along Sangamon river. It is limited to Area I (Fig. 1), where it is a very minor type.

The surface is a gray to light gray silt loam 5 or 6 inches thick in cultivated fields. It is low in organic matter, nitrogen, and available phosphorus; medium to high in available potassium; and medium to strongly acid. The subsurface is a very light gray silt loam. The subsoil, which begins at a depth of 14 to 18 inches, is a gray to pale yellowish-gray plastic silty clay loam to silty clay spotted with pale yellow, brown, and gray. Free carbonates are sometimes present in the loess beneath the subsoil. The underlying till is always calcareous except possibly for the first few inches.

Ward silt loam is not a productive soil. Under the best treatment it will produce fair yields, but in wet seasons crops will often be injured by poor drainage.

Artificial drainage is needed throughout the type and is especially important where water collects in the slight depressions. Since the subsoil is slowly permeable, tile do not draw freely, and surface ditches or open inlets to tile lines are often needed.

Soil tests should be made to determine the need for limestone, phosphate, and potash. Limestone and manure are the treatments which will probably give greatest crop increases, although phosphate and potash should also be applied if the soil tests are low. A standover legume-grass sod should be in the crop rotation two years out of every four or five.

Strawn silt loam (224) is a light-colored soil similar to Birkbeck except that it occupies somewhat steeper slopes and the loessial material is less than 3½ feet thick. It occurs in the I areas (Fig. 1), and is most extensive immediately to the south and southwest of Decatur. It also occurs on the rolling uplands with slopes of 5 to 15 percent along most of Sangamon river and its branches.

The surface is a grayish-yellow silt loam, 5 to 6 inches thick in cultivated but uneroded fields. Where untreated it is low in organic matter, nitrogen, and available phosphorus, medium to high in available potassium, and medium acid.

The subsurface is a brownish-yellow silt loam. The subsoil begins at a depth of 10 to 15 inches and is a brownish-yellow silty clay loam. Some sand grains and pebbles are usually present in the lower subsoil and may also occur throughout the profile. Pebbles are often present on the surface where erosion has been severe.

Surface drainage or runoff is rapid to excessive, and erosion is often severe following cultivation. Few or no clean-cultivated crops should be included in the rotation unless added protection is given in the form of contour cultivation, strip cropping, terracing, or some combination of these practices (Table 3). Standover legume-grass sod for pasture should make up a large part of any cropping system. Many areas can well be left in permanent grass or trees. Limestone, phosphate, and potash should be applied according to the results of soil tests.

Sunbury silt loam (234) is a moderately dark soil which occurs as a transition belt of varying width between the light-colored soils of Area I and the dark soils of Area H (Fig. 1). It occupies nearly level to gently sloping topography, or slopes between about 1 and 4 percent. It may be thought of as lightly timbered Flanagan.

The surface is a brown to grayish-brown silt loam 6 to 8 inches thick. In untreated fields it is moderately high in organic matter, nitrogen, and available potassium; low to slight in available phosphorus; and medium acid. The subsurface is a gray or brownish-gray silt loam. The subsoil, which begins at a depth of 16 to 18 inches, is a brownish-gray moderately plastic silty clay loam mottled with pale yellow, brown, and gray. Below 35 to 38 inches the material is a friable silt loam (loess) which is often calcareous (limey) at 45 to 48 inches. Calcareous permeable till is beneath the loess at depths varying from 50 to 70 inches.

Sunbury is somewhat less productive than Flanagan (Table 1); however, it may be managed in much the same way (*see* page 13). The chief difference is that more attention needs to be given to applying limestone, phosphate, potash, and organic matter on Sunbury.

Alma silt loam (118) and Elco silt loam (119) are very minor types in Area L (Fig. 1), which are shown on the old soil map as No. 434 areas in the southwestern part of Macon county. A small area lies along the south bluff of Sangamon river adjacent to Christian county, and another area lies along both sides of Mosquito creek north of Blue Mound.

Alma silt loam is similar in appearance to Birkbeck, and Elco silt loam is similar to Strawn, except that weathered till of Illinoian age underlies Alma and Elco.

Camden silt loam (134) is a light-colored soil formed from 3½ to 4 feet of silty material on stratified silty, sandy, or gravelly outwash or terrace deposits. It is very minor in acreage in the Rx areas (Fig. 1) but is somewhat more extensive on the terraces along Sangamon river (*see* soil map). It is similar in many respects to Birkbeck silt loam (233), except that Camden is underlain by stratified materials rather than till. The treatment and management requirements for Camden are similar to those given for Birkbeck (page 23).

Yellow silt loam (35, 435, 935, 1135 on old soil map)

Now subdivided into:

Hennepin loam (25) — *in Area I, Fig. 1*
Hickory loam (8) — *in Area L, Fig. 1*

Hennepin loam (25) is a light-colored soil formed from permeable calcareous glacial till of loam texture. Up to 12 or 15 inches of loess may sometimes be present but usually all loessial material has been removed by erosion. Hennepin is an important soil type in the I areas (Fig. 1), occupying most of the slopes steeper than about 15 percent.

The surface is a yellowish-brown loam to silt loam. In a virgin forest area where erosion has been slight, it is 2 to 4 inches thick. The subsurface is a brownish-yellow silt loam; and the subsoil, beginning at a depth of 6 to 10 inches, is a brownish-yellow clay loam to gravelly clay loam. Calcareous till is usually near the surface, and in many places has been exposed by erosion.

The best permanent use of Hennepin is for timber (Fig. 6). Where the slopes are not too steep, it may be used for pasture, but unless great care is used to prevent overgrazing, erosion will quickly destroy its productive capacity (Fig. 7).

Hickory loam (8) is a very minor type in Macon county, occurring only on the steep slopes in the L areas (Fig. 1). One area occupies the bluff on the south side of Sangamon river bottom next to Christian county.

Steep slopes that have a gradient greater than 15 or 20 feet in a hundred should best remain in timber. If such areas are used for permanent pasture, they should be properly fertilized for vigorous grass and legume growth, and grazing should be controlled so that a heavy cover of vegetation is maintained at all times. (Fig. 6)

An area of Hennepin loam along Sangamon river that has been made unproductive by sheet and gully erosion. Removal of the forest cover, followed by cultivation or uncontrolled close grazing, exposes the soil surface to the beating effects of heavy rainfall. This usually means the beginning of destructive erosion on the steep slopes. (Fig. 7)

Hickory loam is similar in profile appearance to Hennepin except that weathered, moderately sticky till underlies Hickory and unweathered or calcareous, friable till underlies Hennepin. Use and management of the two soils are similar.

Yellow-gray sandy loam (64, 464, 964, 1164 on old soil map)

Now Roby sandy loam (185) — *in Area I, Fig. 1*

Roby sandy loam is a very minor type in Macon county, occupying a few small spots on the uplands adjacent to Sangamon river bottom.

In unplowed areas the surface is 2 to 4 inches thick. It is a brownish-gray loam to sandy loam while the subsurface is a yellowish-gray sandy loam. The subsoil, which begins at a depth of 15 to 20 inches, is a grayish-yellow to mottled brownish-gray sandy clay loam.

Roby is acid and low in organic matter. It is not well adapted to corn, oats, or soybeans but will produce fair wheat, rye, and forage crops. If limestone is applied alfalfa can usually be grown. It is probable, however, that to get good results with alfalfa, phosphate and potash should both be applied in addition to limestone. The amounts of various soil treatments needed should be determined by soil tests.

Yellow sandy loam (65, 465, 965, 1165 on old soil map)

Now Kincaid fine sandy loam (186) — in Area I, Fig. 1

Kincaid fine sandy loam is a minor type in Macon county. It occurs as sandy bluff areas along Sangamon river and occupies slopes varying from 5 to about 20 percent.

In virgin forest areas the surface, which is a brownish-gray sandy loam to fine sandy loam, is 2 to 5 inches thick. The subsurface is a yellowish-brown sandy loam to fine sandy loam or loamy fine sand. The subsoil, which begins at a depth of 15 to 25 inches, is a brownish-yellow fine sandy clay loam. Below depths of 30 to 40 inches the material is mostly loose loamy sand or fine sand.

Kincaid fine sandy loam is not well adapted to cultivation because of the steep slopes and low water-holding capacity. Where limestone is applied and the slopes are not too steep, alfalfa does fairly well. In general, however, this soil is best used for pasture or timber.

TERRACE SOILS

Brown silt loam over sand or gravel (1527 on old soil map)

Now subdivided into:

Brenton silt loam (149) } *in Area Y, Fig. 1*
Proctor silt loam (148) }

These two soil types, which occupy most of the one dark-colored terrace area along Sangamon river northwest of Boody are also important soils throughout Area R, and are described under the section entitled "Upland Prairie Soils" (page 19).

Yellow-gray silt loam over sand or gravel (36, 1536 on old soil map)

Now Camden silt loam (134) — in Area Y, Fig. 1

Camden silt loam occurs in Area Y as small scattered terraces along Sangamon river, as well as in the small Rx areas (Fig. 1). Treatment and management requirements may be the same as for Birkbeck silt loam (page 23). Most of the terrace areas of Camden, however, are small and irregularly shaped, lying along the base of steep bluffs, and are often not readily accessible to the farm lots. Therefore they should probably be used primarily for pasture or perhaps returned to timber production.

Brown sandy loam over sand or gravel (66, 1566 on old soil map)

Now Sumner sandy loam (87) — in Area R, Fig. 1

Sumner sandy loam is a moderately dark sandy soil similar to Onarga sandy loam. It is a very minor type in Macon county, occurring only in a few small spots on the dark terrace northwest of Boody. Treatment and management should be the same as for Onarga sandy loam (page 23).

SWAMP AND BOTTOMLAND SOILS

Deep peat (1401 on old soil map)

Now Houghton muck (103) — *in Area Y, Fig. 1*

An area of 26 acres, forming part of the Lake Fork bottomland in Section 11, Township 18, North, Range 1 East, was originally mapped as Deep peat. It is now largely decomposed into muck. It is used for pasture and until better drainage is provided, it must continue to be uncultivated.

Deep brown silt loam (1426 on old soil map)

Now subdivided into:

Sawmill silty clay loam (107) } *in Area Y, Fig. 1*
Radford silt loam (74) }

Sawmill silty clay loam (107) is a dark soil formed from very dark-colored moderately fine-textured sediments that have been carried into Sangamon river bottom by flood waters. It occurs principally in the western part of the county.

The surface is a very dark-brown to black silty clay loam often 15 to 18 inches or more thick. It is high in organic matter and nearly neutral. The subsoil is only very weakly developed. It is a dark brownish-gray, mottled with yellowish-brown silty clay loam.

Sawmill silty clay loam is a productive soil if it is adequately drained. Drainage can ordinarily be best supplied by open ditches although tile may be used satisfactorily in many places. Where not protected from overflow by levees, areas of this soil should be used for summer crops. Very little if any soil treatment is justified because of seasonal overflow. Where protected by levees and adequately drained, areas of this soil may be used about the same as Drummer silty clay loam (page 19).

Radford silt loam (74) is a dark soil formed from silty sediments recently deposited on a very dark-colored fine-textured bottomland soil similar to Sawmill silty clay loam. It is found primarily along Mosquito creek and in other small creek bottoms in the southern part of Macon county.

Radford silt loam is subject to brief seasonal overflows. Most areas are narrow and irregular and better adapted to pasture than to cropping. Fertilizer treatment is probably not justified because of frequent flooding.

Mixed loam (54, 1454 on old soil map)

Now Huntsville loam (73) — *in Area Y, Fig. 1*

Huntsville loam is a dark soil formed from mixed bottomland sediments mostly of medium texture. It is found principally along Sangamon river and its tributaries.

Huntsville is similar to Sawmill in many of its use and management requirements (*see* above). Some areas, however, are too narrow and irregular for cropping and are better adapted to pasture.

Table 5. — SOILS OF MACON COUNTY, Grouped According to Parent Materials, Subsoil Permeability, Surface Color, and Slope or Topography

Area on Association Map (Fig. 1)	Parent materials	Subsoil permeability	Surface color	Soil types arranged according to topography					
				Depressional	Depressional to nearly level	Gently sloping	Moderately sloping	Strongly rolling	Steep or severely eroded
H and I	Loess less than 6 feet thick on calcareous loam till	Moderate	Black to dark brown	Peotone (330)	Harpster (67) Drummer (152)	Flanagan (154)	Catlin (171)	LaRose (60)	
		Slow	Dark gray	Brooklyn (136)	Thorp (206)				
		Moderate	Dark gray			Sunbury (234)			
		Moderate to slow	Light gray to yellowish gray	Ward (207)			Birkbeck (233)	Strawn (224)	Hennepin (25)
	Sandy loam to sand	Moderate to rapid	Brown			Onarga (150)			
			Yellowish gray			Roby (185)		Kincaid (186)	
K and L	Loess up to 8 feet thick over leached clay loam to clay till	Moderate	Black to dark brown	Peotone (330)	Harpster (67) Illiopolis (65)	Ipava (43)	Bolivia (246) Tovey (247)	Assumption (259)	
		Slow	Dark gray	Denny (45)					
		Moderate to slow	Yellowish gray				Alma (118)	Elco (119)	Hickory (8)
R, Rx also terraces in Y	Loess or silty outwash or both on sand or gravel at 6 feet or less	Moderate	Black to dark brown	Peotone (330)	Harpster (67) Drummer (152)	Brenton (149) Proctor (148)			
		Slow	Dark gray	Brooklyn (136)	Thorp (206)				
		Moderate	Yellowish gray			Camden (134)			
	Sandy loam to sand	Moderate to rapid	Brown			Onarga (150)	Sumner (87)		
		Very rapid	Brown			Hagener (88)			
Y	Bottomland sediments	Moderate	Black to brown	*(All these soils are on depressional or depressional to nearly level topography.)* Sawmill (107), Radford (74), Houghton (103), Huntsville (73)					

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Much new information about soils has been obtained since the older soil maps and reports in the above list were printed, especially Nos. 1 to 53 issued before 1933. For many areas this newer information is necessary if the maps and other soil information in the reports are to be correctly interpreted. Help in making these interpretations can be obtained by writing Department of Agronomy, University of Illinois, Urbana.

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